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AN INVESTIGATION INTO THE APPLICABILITY OF CREATIVITY IN THE MILITARY ORGANIZATION

JOHN F. BAUMGARDNER

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John F. Baumgardner

AN INVESTIGATION INTO THE APPLICABILITY OF CREATIVITY IN THE MILITARY ORGANIZATION

by

John F. Baumgardner

Lieutenant Commander, United States Navy

Submitted in partial fulfillment of
the requirements for the degree of

MASTER OF SCIENCE
IN
MANAGEMENT

United States Naval Postgraduate School
Monterey, California

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John F. Baumgardner

This work is accepted as fulfilling the
research paper requirements for the degree of

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IN

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from the

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ABSTRACT

Creativity and innovation have become key words in the management vocabulary in industry. A discussion of what is creativity and why it is required constitutes the first part of the study. A description of the creative individual and the organizational climate is then contrasted with the various blocks to creativity and the military climate. The final section of the study compares creativity application in industry and the military organization.

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CHAPTER I

THE PROBLEM AND DEFINITIONS OF TERMS USED

For many years there has been a general misunderstanding or avoidance of the creative scientist, engineer, or individual in an organization. However, during the past five to ten years there have been developed general theories on creative techniques and processes that have placed the creative individual in the limelight. Organizations are now faced with the difficult management problem of directing these creative individuals.

It is often overlooked, but the pivotal factor in the overall research and development programs is not capital expenditures and natural resources but the effective utilization of scientists and engineers. The way an organization manages its creative personnel may not only insure our continued high standard of living and material well being, but our national defense posture as well. It may well be that the very question of survival now depends on the creative ability of our scientists and engineers and the rate of technological advance and growth. The development of management techniques that center on

the most effective utilization, care, and cultivation of our creative professionals is required. Creativity will have to represent an integral part of the management policy.

New organizational concepts will have to be developed that center on the creative function. As in any new development, various modifications of the standard management principles have been tried and generally found to be inadequate. It is becomming apparent that to increase the required flow of creativity from scientists and engineers requires more than small administrative changes to the present system. A complete overhaul of the existing practices and an examination and change in many of our organizational concepts appears to be the solution to this problem.

To achieve maximum utilization and output from the skilled technican requires the following from management: (1) an understanding of the creative process, (2) an understanding of the attributes and characteristics of the creative professional, and (3) an insight into the creative climate that best fits the creative process.

It is the purpose of this paper to determine if these

requirements and changes can be incorporated into the Navy management system without major degration to either system.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to: (1) determine the characteristics of the creative process, the creative professional, and the creative climate; and (2) compare these characteristics with the typical Naval organization and management structure.

II. DEFINITIONS OF TERMS USED

For the purpose of this study the following definitions are provided:

Creativity. An orginal concept, or idea, that when implemented will be of benefit to someone.

Creative process. A series of steps which are necessary for the development of an idea or of a problem from its inception to the sale of its solution.

Creative thinking. The recognition and description of a tenable or workable relationship between two or more desparate and previous unrelated objects or actions.

Idea. The construct, an "idea", breaks down into four general categories as follows: (1) a discovery - the perception for the first time of something that has been in previous existence but not previously known; (2) an innovation - something new or novel applied to an existing way of doing something; (3) a synthesis - a different mixture of known elements or parts to make a new whole; and (4) a mutation - an alteration in the form or the qualities of an existing entity or concept. An idea may be any of these or a combination of them (Mason, 1960) and (Osborn, 1957).

CHAPTER II

THE STUDY

This study will be historical in nature, covering the period 1955 to 1965. A review of the periodicals, technical writings, and books, containing articles concerning creativity as applied to organizations and management, in the United States Postgraduate School library and the U. S. Army Leadership Human Resources Unit library, Presidio of Monterey, has been conducted.

The study is divided into seven sections as follows: (1) What is creativity, a discussion of what and how the creative process can be used; (2) Why creativity, a determination as to why we need creativity in the modern world; (3) The characteristics of the creative individual, what differentiates the creative person from the ordinary person; (4) The characteristics of the creative climate, what is the environment in which the creative individual works best; (5) Blocks to creativity, what prevents creativity from functioning everywhere all of the time; (6) The character of the military organization, into what kind of organization are we trying to fit creativity; (7)

and A comparison of creativity in the military and industry, is the application and use of creativity the same for the military as in industry.

I. WHAT IS CREATIVITY

Now that there is a general awareness of creativity, what makes some thinking creative and other not? The actual knowledge of what is creative is poorly defined not only in science, but in business, education, management, and even in the arts.

Because people do not have a concise definition of what creativity actually is, terms such as "original", "talented", and "imaginative" are used interchangeably with "creative". Of these, "creative" is the most misused. It should be understood that we can not discard talent, orginality, or imagination as requirements for creativity. It shall be attempted to show how these attributes make a contribution to the creative process. But none of them alone earns a person the right to be called creative.

Creativeness, as defined, requires two things; an original concept, or idea, and to be of benefit to some-

one. Many people think up orginal concepts but fail to follow them through to completion. Some people even think up new and orginal ideas that are more harmful than good (this refers to the highly imaginative law breaker, not to a new weapon system used for the destruction of mankind). Mason (1960) says, "*Creativeness requires new and beneficial ideas put into action*," which leads us into the development of ideas.

Our definition of an idea includes discovery, innovation, synthesis, mutation, and/or a combination of the above. How do these various groupings develop ideas?

A discovery may come about as the result of an accident, however, a majority of our most worthwhile discoveries are the result of long and careful study by a searcher. It is here that we closely relate the factors of *chance* and *serendipity*. Chance in the development of an idea is generally considered as just "good luck". Serendipity is defined as the discovery of one thing while you are looking for something else. Probably the chief distinction between chance and serendipity is that the serendipitist is usually looking for something. He may not know exactly what, so he is alert to almost any-

thing that comes along. In the sense that he doesn't always find what he is looking for, his discovery may appear to be luck.

Innovation is less complex in its definition and application. In fact almost anything you can buy on the open market is probably a progressive innovation of the orginal design. Here to be creative you merely introduce change by adding something new or by modifying the existing product to produce a new or better product. This is a continuing process of new and improved developments of ideas that were seperate, but fitted into the overall plan.

Synthesis and mutation techniques are well known and the most used methods for the production of ideas.

All of the above methods are examples of how ideas for new things can be developed. Any new creation developed by these methods not only meets the criterion of being new and useful, but also destroys at the same time. Our creativeness can provide us with a new way of doing something or a new approach to thinking -- but only at the expense of giving up the old established ways of doing and thinking. This theory applies only to our

definition of bringing a benefit with change. All new ideas have the problem of overcoming the past to gain acceptance. The job of winning acceptance for a new idea may require more creativeness than did the orginal idea (Osborn, 1957).

With the realization of the power and need of ideas has come the current interest in a new art: that of *deliberate creativity*. This is the utilization of the principles, methods, and techniques we learn from studying highly creative people. Probably the person who should be credited with bringing public acceptance to this art is advertising man Alex F. Osborn. His book *Applied Imagination, Principles and Procedures of Creative Thinking* published in 1953 stimulated many of the current writings on this subject. It is acknowledged that many organizations and men were using the creative process for idea generation, but few would admit it until Osborn's imagination theory gained public acceptance.

There are still many people who doubt that the ability to generate creative ideas at will can really be learned, or they wonder if ideas produced through a formal method can be as good as ideas produced by inspiration. The

learned method has been classified as "secondary creativity". However, recent research (Maltzman, 1960) has indicated that if the secondary techniques are practiced, they will in time improve the creative potential of the individual. Further, even ideas produced by this so called secondary creativity are better than no ideas at all (Mason, 1960).

No one seriously claims that creative thinking is becoming a science or that there is any initiative in making it a science. There is no magic button that can be pressed to turn on creativity. However, there is a generally accepted approach to the creative process that is made up of the following steps or phases: (1) Orientation - picking out and pointing up the problem; (2) Preparation - gathering material relevant to the problem; (3) Analysis - breaking down the relevant material; (4) Hypothesis - piling up alternatives by way of tentative ideas; (5) Incubation - letting up in order to invite illumination; (6) Synthesis - putting ideas together; (7) Verification - judging the resultant ideas.

In summary we should remember that we are not interested in just getting ideas for ideas sake, but for

solving a problem. Creative thinking is not a stunt or a gimmick, but something that every one can use to better meet the needs of his daily life.

II. WHY CREATIVITY

Speaking and writing about creativity has almost become a national pastime during the past few years. It is almost impossible to pick up a magazine or newspaper without finding the words creativity, innovation, or imagination mentioned in some manner. Books are appearing which cover all of the conceivable subjects that might use or be connected with creativity or the creative process. This is a new or maybe, after ten years, we should say aging trend. Why this sudden change for a word that didn't even exist fifteen years ago? What are the underlying factors that foster this interest?

One of the major reasons is the advancement of our technological knowledge. It has been estimated that we are currently advancing our technological knowledge at a rate of 22 per cent a year. This means that our knowledge will more than double every five years. Never

each trait. However, it is possible for an individual to develop his creative potential through a conscious effort to cultivate these characteristics.

Problem sensitivity. Guilford originally defined this as the ability that made men sensitive to their surroundings. Rogers and Mooney speak of this as "openness to experience", possibly a more inclusive term. Generally speaking it is defined as the ability to recognize that a problem exists. This also includes the ability to discard the unnecessary clutter and recognize the real problem in an apparent situation. Problem sensitivity is vital to creativity in the area of problem definition.

Problem sensitivity, in an individual, can be present in many ways: a person may be acutely aware of the difficulties, needs, and feelings of others; he may be quick to see anything that is out of the ordinary or unusal in his daily situations; or he has the ability to see possible applications of things that other people have missed. The problem sensitive person uses his sensitivity to people, situations, environment, and the future to find opportunities for contributing their own ideas and effort in problem solving.

Idea fluency. Idea fluency is the ability to produce quantities of ideas for any given problem. The value of fluency lies in the fact that the more ideas you have to choose from, the more likely is the chance that you will really find a new solution.

The mind must be conditioned to look past the first usable solution and seek all of the possible alternatives. Evaluation must be restrained while thinking up ideas, and in the same fashion limitations of the problem should be temporarily forgotten. The more answers to the problem, the harder it may be to find or choose the best solution. Whiting (1955) says that it is here that some of the creative techniques come into play, i.e., brainstorming, the Gordon technique, checklists, formal relationships, and attribute listings. Individual Creativity and the Corporation published by Manufacturing Group 25 of the Harvard Graduate School of Business Administration contains an excellent discussion of the various idea producing techniques. The idea method selected should provide a quantity of solutions in a very short time. It is here that the free-wheeling creative person is at his best.

People who try to think of ways and means of solving a problem under the worst possible conditions have a very difficult time of thinking up any suitable solutions. On the other hand, those who realize that limitations might have to be applied to the final solution, but who temporarily laid them aside and considered every possible means of solving the problem usually come up with many different ideas in a little under twenty minutes (Clark, 1958). It is true that when these ideas were evaluated in the light of severe restrictions, most of them had to be eliminated, yet some of the ideas looked as though they had merit and possibility. Professor John E. Arnold, M.I.T., (M.I.T., 1956) summed this up by quoting a letter written to a friend by Schiller:

> The reason for your complaint lies, it seems to me, in the constraint which your intellect imposes upon your imagination. Here I will make an observation and illustrate it by an allegory. Apparently, it is not good - and indeed it hinders the creative work of the mind - if the intellect examines too closely the ideas already pouring in, as it were, at the gates. Regarded in isolation, an idea may be quite insignificant, and venturesome in the extreme, but it may acquire importance from an idea which follows it; perhaps, in a certain collocation with other ideas, which may seem equally absurd, it may be capable of furnishing a very serviceable line. The intellect cannot judge all those ideas unless it can retain them until it has considered them in con-

> nection with these other ideas. In the case of a creative mind, it seems to me, the intellect has withdrawn its watchers from the gates, and the ideas rush in pell-mell, and only then does it review and inspect the multitude. You worthy critics, or whatever you may call yourselves, are ashamed or afraid of the momentary and passing madness which is found in all real creators, the longer or shorter duration of which distinguishes the thinking artist from the dreamer. Hence your complaints of unfruitfulness, for you reject too soon and discriminate too severly.

Flexibility of thinking. The third Guilford factor that will be discussed is flexibility of thinking. This ability reflects itself in the wide variety of approaches that the creative person chooses to investigate. The noncreative person's past experience provides him with a comfortable routine in which to operate and he has great difficulty breaking with this habit. The creative person must remain flexible to avoid either of the two main traps in problem solving: (1) satisfice (stopping when you hit upon a workable solution); and (2) mental set (locking in on a single approach to the problem and not looking or considering alternate approaches).

Flexibility will provide the creative person with the means of adapting to change if necessary and not being alarmed if the solution recommended does not work. It

also provides the ability to capitalize on the accidents that occur during problem solving. The creative person will be able to swich his efforts to the more promising discovery or to some new application if his original problem is elusive.

Flexibility may be closely related to fluency of ideas, in so far as the ability to think up different approaches to the problem is concerned.

Originality. Originality is the ability to find a new or different way of solving a problem. It can be called a measure of uniqueness. In everyday problem solving originality is generally not even desired or wanted. However, the ability to be ready to either change with the existing conditions or cause the change is where originality in the individual can mean the difference between success and failure. Needless to say, the greater the degree of originality used in solving the problem, the more difficult it is to get that originality. It takes much extra effort to break through the normal routine of everyday thinking patterns and come up with new ideas that are not only useable, but are also different.

Motivation. Motivation is probably the most important

characteristic of all for anyone who desires to be creative. Enough drive or ambition can make up for minor deficiencies in some of the other characteristics.

Everyone has imagination, but the creative person has the motivation to carry his ideas through to the finished product.

Motivation has been described as want to (Mason, 1960). If a man wants to be creative he will find a way. The creative man is not driving for his own glorification or power. It is an honest, sincere approach, and can be considered as the love of the work itself.

Drive increases the efficiency and productivity of a person. It allows him to proceed with his solution even in the face of defeat, distraction, and all of the minor interferences of everyday life. The attitude that he is progressing in his work is satisfaction enough until he has solved his problem. It is this directed release of energy that makes the creative person interested in the future and not in the past.

Perhaps we can sum up the importance of drive to a creative person with this quotation, author unknown; "nothing in the world can take the place of persistence.

Talent will not; nothing is more common than unsuccessful men with talent. Genius will not; unrewarded genius is almost a proverb. Education will not; the world is full of educated derilicts. Persistence and determination are omnipotent."

Other characteristics. In addition to the five basic qualities, there are also secondary characteristics that are significant. These are (1) redefinition skill - the ability to shift ideas, conceptions, or objects to use them in new ways; (2) abstracting ability - analytical ability, which allows the creative person to break down complex problems into easily handled componets, while at the same time keeping track of the interrelating parts; (3) synthesizing ability - the ability to pull unrelated ideas into a working whole; (4) organizational ability - the ability to organize thought and the thought process. It is apparent that these secondary characteristics fit into the basic pattern developed above.

In summary, creative people come from all walks of life and have varied educations, traits, and backgrounds. Guilford has established five primary characteristics common to all creative people which are:

problem sensitivity, idea fluency, originality, flexibility, and motivation. Not all creative individuals will have all of these traits. These are the qualities that one should strive to develop if improvement is desired in their imaginative output. However, knowledge of the principles underlying creative thought and personalities will not guarantee that you will be a creative person. The creative potential will merely be present for possible use.

IV. THE CREATIVE CLIMATE

It is difficult for the normal manager to understand or get the feel of the working climate required by creative personnel, unless he fully understands the types of people who work in the fields of science. Part III of this chapter has tried to provide some insight into their needs, attitudes, and characteristics.

There are many differences between the ideal working conditions for scientists and other workers in the organization. In seeking to understand these differences, an important clue can be found in our universities, where most basic research is conducted by

persons working on advanced degrees in their special fields. As in most areas the initial working climate and habits established in their early training carry over into attitudes and desires in their present jobs.

The atmosphere of the university laboratory is a mixture of permissiveness, lack of pressure, and concentration on the ideas and knowledge characteristics of academic life, on the one hand, and on the other, is the rigorous discipline of scientific methodology. These laboratories may differ in various ways, such as reputation, areas of interest, financial support, equipment and facilities available, but they always have the following characteristics in common:

1. Perhaps the single most important characteristic of the university laboratory as implied above is the emphasis on basic research and on the discipline of scientific methodology. This implies the pursuit of knowledge according to a rigorously defined methodology which demands observation, separation of facts from opinions, the recording of results, and the reporting of verifiable conclusions.

It is no accident that most of the basic research

done in this country, with the exception of a few laboratories supported by our largest industrial companies, is done in universities. The goal of any university is the pursuit of knowledge without reference to the practicability of its solution.

2. A second fundamental characteristic evidenced is the permissive, low-pressure atmosphere which is found in the university laboratory. Within this atmosphere individuals make many decisions for themselves about their work and direction it will take, while at the same time always having the counsel and direction of the faculty group available to them. Within such a climate graduate students learn to think for themselves and necessarily become accustomed to an independence of thought and action which is difficult to eradicate once it becomes a part of their professional life.

3. Another characteristic of the university laboratory is found in the opportunity for constant interaction with colleagues and faculty who are interested in the student's own and related fields of investigation. The student becomes used to being able to talk about his problems with sympathetic and interested co-workers who

have enough knowledge of his field to ask stimulating questions and suggest interesting alternatives. He discovers that his own ideas are often sparked by such conversations and soon learns to depend on the availability of interested and informed colleagues.

4. A further characteristic concerns the basic motivation of faculty and students alike. This motivation can best be described as a desire for intellectual development and achievement. The heroes of the scientific world are men who have made great discoveries, men who have added significantly to the world's knowledge in various fields. The graduate student of science, no matter what his future career may be, never quite gives up the hope that he too will someday record significant additions to our store of fundamental knowledge.

5. A final important characteristic is suggested by those already stated, and it concerns the way scientifically oriented people evaluate themselves and their colleagues. Scientists are evaluated according to their knowledge of their field, the degree of expert methodology they display in their work, and the originality of thought and method evidenced in reports of their

work. For the rest of their careers they will always be evaluated in these terms, and, since no one else knows enough about their work to evaluate it accurately, the judgement of their colleagues in the scientific world will always be more important to them than judgments made by persons outside this area (Orth, 1959).

From this atmosphere the scientist and engineer enters industry where the general objectives of the creative climate are to encourage more creative thinking on company problems; to make sure that new or original ideas are never blocked or sidetracked without consideration by the company; and to provide whatever training, indoctrination, and encouragement necessary to help workers think constructively and creatively about everything the company does or need to do. As you can see this is a considerable change from his university life. How can we maintain or provide a working climate that is oriented to these purposes, but is acceptable to the individual?

History indicates that the professional in any field has been used to and expects a certain deference based on his knowledge and skill. The creative man has always

insisted on creating for himself a climate where ideas flow freely, or at least, where he can find independence within a group that has similar pursuits.

Creative activity cannot be forced. The greatest additions to our cultural heritage have been made where the artist and/or scientist have been revered. It is also worthy of noting that in Russia where the present day scientist is placed on a pedestal, scientific and technical progress is proceeding at a rate that we are finding difficult to match. It is necessary to provide creative personnel a climate where their talents can be exploited to its greatest extent.

The optimal climate for creative research has several elements which blend together to form an atmosphere in which the creative person can operate with a minimum of distraction. Most of these elements follow directly from the proceeding statements concerning the university laboratory and the attitudes of scientific personnel.

The first step in developing a creative climate is the responsibility of management. Just having a creative climate in an organization will not solve all of its

problems. The effects of the creative climate can spread throughout the organization, but may not concentrate in any one area sufficiently to accomplish its purpose. We must give our "creative climate" direction. Management can bring out creative effort, and it can also kill it. Most managers have to exercise good judgment; whereas, creativity involves risk and taking of chances. We want a manager that is open minded to both of these requirements.

Management, from top to bottom, must make an analysis of their attitudes toward creativity. Does the company really want creative ideas, is it able to adapt to proposed changes, and most important, is management sincerely interested in them? Thus, the initial key rests in management's attitude toward creativity. If management really wants and desires creativity, the following management practices are required to have a functioning creative climate in an organization:

1. An open-door policy.
2. A "freedom to fail" attitude.
3. First-class facilities for the type of research to be conducted.
4. Colleagues of high professional status.
5. Work assignments that are interesting and challenging, with mobility within the orgnization.

6. An understanding and appreciation of the importance of research to the organization.
7. A creativity training program.

Mason (1960) states that many executives have heard of the open door policy and think that they practice it. In reality, the door may be open, but the mind is closed. All levels of management must not only be available, but approachable with new ideas. As a manager you must pave the way for new ideas. You must be a good listener and reject the temptation to reject an idea before you have rally evaluated it.

The development of ideas is closely associated with the "freedom to fail" attitude required in the creative climate. Randall (1955) points out that the consequences of failure must not be a great influencing factor in the creative individuals or groups work. Many projects may be started, but only a few will prove of any benefit to the organization. No one can produce successes every time. You may be losing the most valuable ideas when only the acceptable ideas are presented to management. Ideas, good or bad, lead to other ideas and these may provide the answers to many other problems under attack.

Closely associated with the "freedom to fail" atti-

tude is the organizations understanding and appreciation of the research function. It is very important that management establish and maintain a long run atmosphere of confidence in their research department. Once this atmosphere is established, periodic reviews of research policies and financial commitments may be undertaken as necessary without endangering the creative climate.

There are also tangible items that fit into the creative climate. The importance of having modern facilities is obvious, and will play an important part in the attraction of top quality professional researchers to the organization. This combination of facilities and researchers provides management with a powerful tool. Management must adapt to this team, or maybe even become creative in the management and utilization of these resources. Orth (1959) developes the theory that the key to management of creative research is in the assignment of interesting and challenging work, with the opportunity for mobility within the organization.

The opportunity for mobility must be present. If we think of research as a total spectrum with basic research at one end and product development at the

other, it will be important to organize our laboratory so the researcher can move from one step to the next with ease and freedom. Usually the young scientist will want to continue basic research as he did in the university. It will be much easier to ease him through the entire process with the proper administration and laboratory organization.

The last necessary item in the creative climate is that of training for creativity. This may appear as an unnecessary step in the creative climate, but the education of all levels in the organization paves the way for understanding the creative individual. Creative training programs are aimed at teaching the employee to use his own mind in problem solving. The course is generally aimed at developing middle management executives, or men who are considered as good prospects for management positions. The purpose of the training is not only to increase the individual's creative output, but to make him more receptive to ideas from others. Thus, the individual not only understands the creative process, but will help establish the creative climate by being receptive.

In summary, the initial burden of establishing a creative climate has been placed on management. However, there are certain other basic factors that are required to have a creative climate. These physical and organizational factors play a very important role and should not be over looked by management in establishing a creative climate.

V. BLOCKS TO CREATIVITY

The nature of creativity, the increasing need for its development and the elements of an optimum creaative climate have been stressed in the preceeding portions of this paper. It is logical to next examine the factors tending to inhibit this ability.

Some of the factors which inhibit creativity, depend on the individual, like the inability to overcome certain blocks. Yet there are other inhibiting factors for which the individual has only partial responsibility. This is because the individual is raised in society. Also, most people work in an organization that has all of the characteristics of a small society producing additional factors that inhibit creativity.

Thus when an organization plans to foster creativity it is up against many barriers, few of which are under its direct control. A description of the barriers generated by the individual, society, and the organization follows.

INDIVIDUAL BLOCKS TO CREATIVITY

Since the individual is considered to have the most important role in the creative process, the factors he himself generates and which tend to inhibit his creativity will be discussed first.

One factor often overlooked is just plain laziness. Being creative requires an effort and it is easy to see that laziness can block imagination, initiative, and communication. Man like any animal tends to follow the path of least resistance. As Professor Nolen (1957) of Harvard Business School points out, there are all sorts of subterfuges which our mind can invent to avoid going to work creatively. He lists three main ways by which we avoid creativity: (1) we fail to see a problem, (2) if we really face up to the problem, we avoid seeing it as it really is, and (3) we adopt a solution which is really just a pattern resurrected from our memory

instead of a truly new idea.

This first block is the easiest to overcome and recognize, but other individual blocks are not so easy to detect. These blocks either prevent the individual from getting away from the conventional solution or they prevent him from seeing elements of the solution in a new way. Inhibitions paralyze the faculties of an individual and prevent him from attaining a goal that is reachable. Inhibitions can also prevent an individual from being creative even though he is intelligent.

Professor John Arnold (M.I.T., 1956) Stanford University classifies inhibitions into three main categories of blocks to creativity: perceptual, emotional, and cultural blocks.

Perceptual blocks are those which cause a failure to use our senses correctly in questioning and observing the real world. The following are some examples of perceptual blocks listed by Professor Arnold a few years ago while at M.I T.:

1. Difficulty in isolating the problem.
2. Difficulty from narrowing the problem too much.
3. Inability to define or isolate attributes.
4. Failure to use all the senses in observing.
5. Difficulty in seeing remote relationships.

6. Difficulty in not investigating the "obvious".
7. Difficulty arising from not recording "trivia".
8. Difficulty arising from conceptulizing on the basis of superficial likeness.
9. Failure to distinguish between cause and effect.
10. Difficulty in working with false data.

The second category of blocks are emotional blocks. Arnold describes them as:

> These produce dread, fear, greed, hate, love and so forth. These blocks result from a departure from our normal state of being, and emotional response. They often prevent a man from doing something new and orginal. (1955 Manufacturing Report at Havard Business School)

Here are a series of examples of emotional blocks:

1. Fear of making a mistake or making a fool of yourself.
2. Difficulty in rejecting a workable solution and searching for a better one.
3. Difficulty in changing set.
4. Over-motivation to succeed quickly.
5. Pathological desire for security.
6. Fear of supervisors and distrust of colleagues and subordinates.
7. Lack of drive in carrying program through to completion and test.
8. Lack of drive in putting solution to work.
9. Inability to relax and let "incubation" take place.
10. Refusal to take detour in reaching goal.

The third category of blocks described by Professor Arnold are the cultural blocks. They could as well be called social blocks, since they arise under the influence of people, or groups of people. They are acquired by

the individual through his parents, teachers, and working contacts. Professional and social contacts are also sources of factors inhibiting creativity. Cultural blocks tend to orginate in groups of any size and take various forms: traditions, conventions, and group thinking.

One of the blocks we have already encountered is group thinking. We have seen how people who live or work closely together tend to acquire similar patterns of thought and action. This, like any conformity tends to paralyze the creativity of an individual. Beliefs of the group are accepted without question. Professor Arnold can provide us with a few examples of cultural blocks:

1. Desire to conform to an accepted pattern.
2. Must be practical and economical above all things.
3. Not polite to be too inquisitive and not wise to doubt everything.
4. Overemphasis on competition or on cooperation.
5. Too much faith is statistics.
6. Difficulties arising from over generalizations.
7. Too much faith in reason and logic.
8. Tendency to follow the all or nothing attitude.

We have seen the blocks to creativity of the individual divided into three classes: perceptual, emotional, and cultural. These blocks are not always operationally useful

because various blocks can be combined an infinite number of ways. The best way to eliminate these blocks would be to hire only people without blocks, if you could find them. However, this would not fully solve your problem, as you would have to introduce them to the two main sources of blocks: society and the organization. It is for this reason that we will now examine the generation of society and organizational blocks.

HOW SOCIETY GENERATES BLOCKS TO CREATIVITY

There are in society a multitude of pressures which push the individual to conform to certain accepted patterns. Societies have always built legal, social, and psychological barriers to prevent or at least minimize change. The strongest of these pressures are called ethics and morals. They all tend to prevent the individual from being creative by preventing the use of non-conventional thinking.

The danger of these pressures is that they tend to make people accept as truth patterns what is no more than relatively accepted social patterns. Social patterns

tend to be accepted very fast because man would rather be lazy and accept a pattern than try to be original. We all tend to like the coziness of conventions and traditions. Dr. Verplank (H.B.S. Group 25, Manufacturing Report, 1955) of Harvard points out that social conformism can prevent us from being creative. It is what he calls "social restriction". He says,

> Social restrictions impose limitations upon our thought. By feeling that certain social limitations exist, we tend not to explore beyond them. In many cases we do not even question why such limitations were established.

There are today, in the American society, a large number of pressures which push the individual to conform. It is not our purpose to describe the problem of conformism. This problem is not special to this country, and it has become the central theme of many writers in recent years. We are, however, concerned with this problem, because creativity requires non-conventional thinking. Almost everything which is connected with conformism can be considered an inhibitor of creativity.

There are also two strong attitudes in the American society which are holdovers from our early days. They are still very much alive and still, as in the past, inhibit

creativity. These attitudes are: (1) fear of being a dreamer and (2) the fear of seeming to be above the average.

Dreaming still is considered a waste of time. Many of our psychological tests for executives include a question like "do you daydream". Look magazine stated that, "Most of the great advances of the human race, including ideas for American business have sprung from daydreams." (Look, 1958) Yet it is well known that some dreaming or incubation is necessary to the creative process.

The second of these attitudes is very strong because it is sunk deeply into the mind of most Americans; it is the fear of being different. The particular fear of being above the average is chiefly acquired during the educational period.

The factors that we have just mentioned are rather specific to this country, but the modern way of life generates a number of other factors that are felt all over the world. In recent years our lives have tended towards uniformity in many fields. As it has often been commented, there is only a short distance between

uniformity and conformity. This pressure toward uniformity tends to increase with progress in technology which stresses the needs for mass productions and for fashion. At the same time, our communications media tend to reach everybody in the same way. Our society is tending to think and act alike which is a block to creative thinking.

It would be a mistake to think that only the individual and society are geneators of blocks to creativity. The organization where the man works often generates strong blocks to the creativity of its employees.

HOW THE ORGANIZATION GENERATES BLOCKS TO CREATIVITY

The fact that the corporation offers very strong blocks to creativity has been particulary stressed by Mr. Ohmann, Director of Organization Planning and Management Development at the Standard Oil Company of Ohio. Ohmann (1957) says:

> It seems clear that the future increases in productivity will continue to depend primarily on combinations of technological, economic, and perhaps administrative or managerial innovation. However, as industrial organizations grow in size, they become more formally structured, more standardized in their operations and more time and energy will necessarily

> be devoted to the coordination, maintenance and service of the organization itself. Resultant power centers and the rigidities established to support them are natural enemines of the creative spirit.

This is particularly important because, as we have mentioned earlier, the organization needs more and more creative contributions from its employees to stay competitive and fulfill its goal of meeting the challenge of tomorrow. Some conciliation between these contridictory requirements will have to be found.

Ohmann lists seven main blocks that the organization generates and which tend to restrict the ability to be creative. These blocks are: authoritarianism, standardization, specialization, breakdown between thinking and execution, bigness per se, in-company traditions, and finally, resistance to change. It should probably be easy to add more blocks to this list which is not complete. For instance, short term outlook and pressure, excessive problem solving approach, social work-group norms, and information blocks tend to appear in the organization and have as an indirect effect to restrict creativity

As Ohmann mentions, "the organization is essentially

authoritarian in design and in operation. The emphasis is on getting things done and conducting the necessary operations, rather than on creating and dreaming." In an organization, discipline tends to take precedence over creativity.

Another main block to creativity is the fact that the organization tends to resist change. This fact that we have already mentioned is strengthened in the corporation by three main factors: in company traditions, social work-group norms, and traditions inherent to specialties and professional trades. It is a well known fact that groups tend to get traditions and habits and that they will resist strongly to any change which might interfere with these habits.

The third main point is that there are present in the corporation factors which tend to stress uniformity and which create pressure for conformity in thinking. These factors are repetitive work, standardization, and, finally, specialization. Standardization is necessary with modern technology in order to cut costs. It tends to stress uniformity and kills initiative which as we have seen is an important component to creativity. Special-

ization is another way which has been used to achieve efficiency at the operating level. The main trouble with specialization is, as consultant Robert McMurry (Harvard GR25, 1958) points out, "it is always hard to make a generalist out of a specialist."

The fourth and last main point is that the corporation by its "bigness per se" can be inhibiting the creativity of the individual employee. This is accomplished because the individual feels less sense of responsibility in a big organization than in a small one.

I have mentioned a certain number of blocks to creativity that an organization tends to generate. Many others can be found according to circumstances. All of the blocks mentioned do not exist in any one organization; the important thing is that they could exist. It is the same thing with the social and individual blocks. According to the situation one or several of these blocks will be particularly strong in attempting to block creativity within the organization (Ohmann, 1957).

VI. THE CHARACTER OF THE MILITARY ORGANIZATION

There have been many writings by both military and

non-military authors concerning the organizational characteristics of the military, so it will not be necessary to provide a detailed study here. However, comments on some of the major characteristics which are different from normal industry practice are appropriate.

The first apparent difference between the military and industry is that the military is organized for the purpose of fighting a war. This is a very important restriction as it must always retain this capability even though a majority of its operations will be conducted during times of peace. Therefore the organizational principles used in war will have to be its standard operating procedures.

The major orgnizational requirement of a military organization is to have the capability to continue functioning even if its leaders have been killed. This single requirement has developed the military into a model of organizational efficiency. This is not financial efficiency, but functional efficiency. The basis for this efficiency is discipline beyond anything demanded by other organizations. It is this disclipline and techniques that relate

the military organization with its doctrine.

Doctrine in the military sense refers to procedures only. These procedures are written and relate to all operations throughout the military organization. They start with the most simple instructions as to how to fill out a pay chit, and extend to the most complicated operations that the military can envision. The doctrine is designed to provide not only conformity but also uniformity of actions within the organization. In current years the scope of operations has become so large that the doctrine has been changed to provide for centralized control and decentralized operations. This is where unity of doctrine, provided that it is soundly based and known, will let decentralized operations function with the same efficiency as a centralized operation. Here the doctrine itself is the authority, and is considered as strong as any rule or regulation that could be imposed.

The intended purpose is that all units in the chain of command know not only what is expected of them, but in what manner they are to act. How can this be accomplished? The military has fully developed the line-

staff and scalar principles or organization theory. These principles are well known, but what is not so well known is that the scalar chain has been considerably lengthened in recent years. To further add to the management problem, each level in the chain has tended to become formally organized and place requirements on those lower in the chain. This principle is behind the so called "paper factory " in the military. Everyone must report his actions and plans to someone higher in the chain and this continues until the senior officers know what everybody is doing or planning to do. As you would think, this principle also works in reverse. A simple order may cause many problems as it is relayed down the chain with normal additional requirements placed by subordinates on still lower subordinates.

To further confuse the issue, a function such as research may be placed in either the line or staff and be many levels below or horozontally removed from the ultimate users of their products. Thus many administrative functions will be required to justify and report the research projects accomplished by any particular group.

Inorder to fill the many positions in the scalar

chain, the military is a rank order organization. Seniority and rank remain with the individual as he is transferred from job to job. The relative position in rank and seniority determines to a great degree where the officer will be ordered. It is expected that as an officer advances in rank, he will be able to serve in almost any service job that is available. To insure that an officer has the broad background necessary he is continually rotated from job to job. Average time on an individual job is about two and one half years. This policy leads to the assignment of officers to a project that has been started or is about to end when he has no background as to what has taken place prior to arriving at the new billet. It is apparent that an officer cannot know everything in the service, so we get officers in charge of projects that have no technical knowledge in that field.

However, in defense of the military officers, it can be said that he is considered a highly competent leader of men. In dealings with creative research personnel, this factor may outweigh the lack of pure technical knowledge. He can act as a perfect buffer

between the military and the creative individual. His ability to cope with the military procedures will provide the project with the necessary stability to proceed where a civilian counterpart might get bogged down. This is not saying that it takes a military leader to operate in the military organization, however, the regulations and procedures of the military will be with us as long as we have a military, and who can cope with them better than the military officer who lives by them.

In summary, it is apparent that the military is a highly structured organization with many rules and regulations providing the guidance necessary for conformity and uniformity of actions by all. The military officer is generally a highly skilled leader of men, and can provide some stability for the research team or creative individual to function in the military climate.

VII. A COMPARISON OF CREATIVITY IN THE MILITARY AND INDUSTRY

A comparision of creativity in the military and industry logically divides into the two major areas associated with creativity; that of product and process orientation. The first comparison will be with the

product orientated aspects of creativity as applied to industry and the military. The second comparison will be with the uses of the creative process in industry and the military.

The place to start comparing products is with the attitude of top management as to the need for creativity to operate. It is here that one sees the first major difference in industry and the military.

Industry operates in a highly competitive market and must provide a financial return to its owners or stockholders. Thus, it is product or service orientated and has to provide the market with the best or at least comparable model or service to survive. This constant pressure to change and improve the product line has convinced industries top management that creativity is necessary to survive. Contrast this with the military, where there is only one product (to be able to fight a war) and it is not in constant competition. As with industry, our military does have to be the best; however, it has been the best for a number of years, and has not had to change as often or as fast as industry to meet the threat.

The product also plays another important part in this comparison. Industry produces and markets its product, where the military buys whatever is necessary to fight the war. What then are the consequences if a product is accepted or fails? In industry, if accepted, it goes into production and they make a profit, if it fails, production is stopped and the loss is absorbed and they try again with a new product. However, the nature of the military product denies it the right for failure once it has been accepted. It is here that the military by not producing its products, requires that it be acceptable in all respects on purchase. I am not saying that the military never makes a mistake in weapon procurement, it has and probably will in the future, but non-acceptable items must be kept at a minimum.

Thus along product lines, industry as a producer and seller has to apply creativity to survive, where the military as a buyer needs only to think up the idea, half of our definition of creativity, and wait for industry to provide the final product. In a way it can be said that the military forces industry to be creative in meeting its changing requirements for products.

The next concept that one has when he hears the word creativity is that of a process which generates ideas. This is a vital factor in both the military and industry. The initial requirement for change in product line by industry caused the development of idea generation techniques. These techniques have since been applied to problem solving in general and have become very useful tools for both industry and the military. The generation of an idea is one thing, but the selling of a solution is another. There is no industry organization the size of one of the military services, and very few require the standardization of procedures as does the military. Thus, if the idea applies to the organization, the military will staff the solution on all levels and investigate it from all aspects to determine if it is applicable throughout the service. Industry, on the other hand, due to its smaller organization, can suboptimize and place the idea into effect if it offers a savings in either men, money or time. The creative individual will probably have a difficult time selling his idea in either organization, but the military man will probably only be able to deal with the next higher level in the organization and then rely on

the chain of command to forward his idea through the many levels required to get acceptance.

There is one area where the creative process has an application in the military, but no apparent counter part in industry. This is the field of military tactics and doctrine. This is the major area where there is constant change and need for improvement in the military, and it might logically be compared with the product problem in industry. It is exactly the same, as survival is the end result. It is here that the creative individual can and is encouraged to sell his new idea. There is even a standard procedure established to insure that the idea receives the attention necessary to test and evaluate its applicability in the shortest amount of time. This is in part due to the requirement for standardization in the service, and to insure that simultaneous evaluation is being conducted by all users at the same time. This further insures that the ground work has been accomplished and nothing will hinder implementation if accepted as standard doctrine. This is the area in the military where an understanding of the creative

process and idea generation techniques are required to meet the constant change of tactics and doctrine.

In summary, it is apparent that both industry and the military require creativity; industry primarily for product development and the military for the use of the creative process in idea generation in the field of tactics and doctrine. The size of the military organization and the requirement for standardization generates time and effort problems in the sale of an idea in areas other than tactics and doctrine. Both industry and the military appear to be aware of what creativity is and what it can do for them in problem solving, with industry conceded the edge as to application at this time.

CHAPTER III

SUMMARY AND CONCLUSIONS

What is creativity? This is a term that is poorly defined, but the generally accepted definition is an original concept, or idea, that when implemented will be of benefit to someone. It has been proven that man can develop his creative ability by training and practice. This art of "deliberate creativity" or the use of mechanical techniques in idea generation was first publicized by advertising man Alex F. Osborn in 1953. Since that time there have been many new techniques and theories about the creative process. However, there is general agreement about the steps or phases that make up this process. These steps are: orientation, preparation, analysis, hypothesis, incubation, synthesis, and verification. The use of the creative process will help the individual or group in idea generation for problem solving.

Why do we need creativity? The second part of the study presented the following two basic reasons.

First is the great rate of growth in our technical knowledge, and second is the changing nature in the work required of man in the modern organization. Vroom (1965) sums the need for creativity as follows, "Ideas are the lifeblood of industry and the forerunner of change. To stifle them is to stifle progress. We must continue progress to maintain our relative position in the world."

The characteristics of the creative individual followed next and a review of current and past creative people indicated that they came from all walks of life and have varied educations, traits, and backgrounds. Dr. Guilford, who has conducted the most comprehensive study in this field, has determined five primary characteristics common to all highly creative people: these are; problem sensitivity, idea fluency, originality, flexiability, and motivation. There are numerous secondary traits such as redefinition skill, abstracting ability, synthesizing ability, and organizational ability. There are probably many more, but they will fall under a general category of one of the primary characteristics. The individual traits and needs of the creative person

will vary with the individual and situation into which he is placed.

The characteristics of the creative climate was the next area discussed. The individual again determines what he wants, but his desires can be traced back to his university life. This is where the creative person starts his research work, and the habits and atmosphere established here will remain with him the rest of his life. The establishment of the creative climate in an organization is primarily a function of management.

First management must want creativity, and can establish the creative climate by setting up an open door policy between management and employee, encourage the employee by setting up a freedom to fail attitude in their research, and by establishing a creative training program to indoctrinate not only management, but the entire organization as to what creativity is and how it works. To further set the stage for creativity, the organization must provide modern facilities and interesting work assignments.

To complete the creative climate, the organization must feel that research is important and necessary for

the future progress of the organization.

What are the blocks to creativity? These blocks break down into three groups which are: individual, society, and organizational.

The main individual blocks are laziness and inhibition. Inhibition further breaks down into the three areas of perceptual, emotional, and cultural blocks. The society blocks basically refer to conformity and uniformity restrictions that are placed on man as he proceeds in his daily life. These blocks overlap with the organization blocks because the organization is really nothing more than a small society. Mr. Ohmann lists seven main organizational blocks as: authoritarianism, standardization, specialization, breakdown between thinking and execution, bigness of organization, in-company traditions, and resistance to change. One or more of these blocks will be present in any society or organization you can think of.

Now that we have studied the what, why, individual and organizational elements of creativity, what are the characteristics of the organization in which they will be placed? The military organization can best be described

as being an efficient organization which is managed in an uniform and regulated way. Its single purpose is to fight a war, and it is organized to do this at all times. Thus, the organization is adapted to the single product it provides. The military officer is generally a skilled leader of men, and can function as a buffer between the creative research and the military organization.

The final section of the study is a comparison of the applicability of creativity in the military and industry. It was determined that both organizations use and require creativity for different reasons. Industry primarily uses creativity in product development, while the military requires the use of the creative process to generate ideas for changes in tactics and doctrine. The creative individual in either organization will have a difficult time in selling his idea to management.

To summarize, management has been charged by many critics with stifling creative thinking and insisting on conservative and traditional conformity, and there is no doubt that these charges are at least partly true. It is clear that both conformity and creativity are needed in industry. Undirected creativity would surely result in

corporate chaos; management controls and spelled-out objectives, procedures, and policies are all required if an organization is to operate efficiently. But there is also a greater need for more creative self-expression than many organizations will allow if we are to continue to progress and develop new approaches and improvements.

I. CONCLUSIONS

The following conclusions have been reached as a result of this study:

1. That the military organization offers more blocks to creativity than civilian industry. This is due to the highly uniform structure of the military organization and its single product nature.

2. That the military is correct in not conducting extensive basic research projects, and should continue to concentrate a majority of its efforts in the applied research area. This is due in part to 1. above and to the fact that as in industry the organization is goal or purpose orientated. Thus in the conservation of money it must devote its research efforts towards its mission.

3. That the application of creativity in the military

should not be primarily product orientated, but should be directed at producing better procedures and tactics. This is the logical area of consentration, as constant change is required to fully utilize all of the technocological advancements in warfare and personnel/material administration.

4. That the creative individual in the military will probably have a much more difficult time selling his ideas than his counterpart in civilian industry. This is due to the change applying to the whole organization vice a single industry.

5. That to gain maximum utilization of men and materials in the military, creativity must be fostered to the greatest degree possible in the areas of problem solving and development of tactics and operating procedures. No organization can afford to give up this powerful tool in problem solving.

II. RECOMMENDATIONS

The following recommendations are submitted:

1. That a study of creative management techniques be undertaken to determine what steps can be implemented to introduce creativity in the military organization.

2. That senior military leaders be required to attend a civilian indoctrination course in creativity, or that an inhouse training program/orientation course be established. This program should be made available to all levels of command in the organization.

3. That the following three books be placed on the recommended reading list for military officers: "Creative Management" by Norman R. F. Maier; "How to be a More Creative Executive" by J. G. Mason; and "Managing Creative Scientists and Engineers" by Eugene Raudsepp. These books provide an excellent orientation into what creativity is and how a manager can incorporate it into his organization.

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